Compendium of practice for Commercial dishwashing

Section 10

Plastic wash items

Contents

1. Types of plastics used in commercial machine washing and their properties

Plastics are distinguished into **thermoplastics** and **thermosetting plastics** based on their physical properties.

Thermoplastics have a linear or slightly branched molecular structure, depending on their degree of rigidity. This structure makes thermoplastics malleable at higher temperatures. The initial plastic form becomes firm and stable after the molded part has cooled down, provided that the manufacturer's temperature recommendations are observed.

Thermosets are hard and have a dense and branched molecular structure. They harden during molding. After that, they can no longer be shaped by heating.

The following are primarily used for the manufacture of consumer goods made of plastic:

Thermoplastics:

ABS (polyacrylonitrile-butadiene-styrene)

ASA (polyacrylonitrile-styrene-acrylic ester)

PA (polyamide)

PC (polycarbonate)

PE (polyethylene)

- LDPE = low-density PE
- HDPE = high-density PE

PES (polyethersulfon)

PET (polyethylene terephthalate)

PHA (polyhydroxyalkanoates)

POM (polyoxymethylene)

PP (polypropylene)

PSU (polysulfone)

PTFE (polytetrafluoroethylene)

SAN (polystyrene acrylonitrile)

PCT (thermoplastic copolyester)

Thermosetting plastics:

GFK (glass fiber reinforced polyester resin)

MF (melamine)

Regulatory restrictions must be taken into account for some of the plastics listed.

As a general rule, when using plastics for food applications, legal requirements such as EU2024/3190[1] and EU10/2011[2] must be observed.

Compared to porcelain and glass, plastics have the following properties:

- significantly lighter
- more scratch-sensitive
- more shock-proof and break-proof
- quieter
- lower heat retention capacity

[1] COMMISSION REGULATION (EU) 2024/3190 of December 19, 2024, on the use of bisphenol A (BPA) and other bisphenols and bisphenol derivatives that have received a harmonized classification based on specific hazardous properties in certain materials and articles intended to come into contact with food, amending Regulation (EU) No. 10/2011 and repealing Regulation (EU) 2018/213.

[2] Regulation (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food.

2. Recommendations for purchase plastic wash items

When purchasing plastic consumer goods for commercial use, ensure that the items to be washed are made of suitable material and are dishwasher safe.

It is important that:

- there are no sharp edges or dead corners (spray shadows);
- there are no deep undercuts on the back;
- the recesses for food components on the front are not too steep or even vertical. In both cases, spray shadows form, which prevents proper cleaning;
- the items to be washed are designed in such a way that the detergent and rinse aid solution can drain off easily;
- the shape is designed so that no puddles of water can form (e.g. on the floor) when the dishes are standing on the conveyor belt or in the rack. This would significantly impair the rinsing effect;
- the surface is generally smooth.

If paint, print, or other thin coatings or decorations are applied, make sure they can withstand the continuous stress of washing. Ideally, the decoration should be protected by an additional durable layer.

For example, in melamine tableware, the decorative film is impregnated with melamine resin and additionally protected by the surface glaze.

3. Plastics and their resistance to the washing-up process

Plastics cannot generally be described as dishwasher-proof.

Some plastics cause problems due to their lower heat resistance and lack of chemical resistance. Depending on the material, a shorter service life of the washed items can be expected at higher temperatures (>65 °C) and longer contact times (>2 minutes), e.g., during thermal disinfection.

Dishwasher-proof plastics include:

- PP (polypropylene)
- POM (polyoxymethylene)
- MF (melamine)
- GRP (glass fiber reinforced polyester resin with a melamine surface (not for thermal disinfection)
- SAN (polystyrene-acrylonitrile)
- PCT (thermoplastic copolyester)

Surface damage (scratches, matting, fading, etc.) can be caused by mechanical strain during use, which can impair appearance and hygiene. Typical examples of this are plastics made of ABS (acrylonitrile butadiene styrene) and PA (polyamide). In addition, these plastic parts are sensitive to alkalis and can be attacked by intensive cleaning agents. Therefore, they cannot be thoroughly cleaned with highly alkaline agents.

Certain plastics, such as PC (polycarbonate) or PSU (polysulfone), are prone to stress cracks due to their material properties.

Plastic tableware with a damaged surface can discolor very easily when it comes into contact with food.

Melamine tableware is likely to turn yellow when it encounters cleaning agents containing active chlorine.

For plastics with rapid biodegradability (according to EN 13432), such as PHA (polyhydroxyalkanoates), appropriate resistance to commercial machine washing must be proven.

Always follow the instructions provided by the manufacturer of the items being washed and the detergent.

4. Tips for the optimal use conditions of plastic wash items

In particular, ensure that:

- a suitable detergent and rinse aid is used;
- plastic dishes are lighter than other dishes;
- the items are loaded into the machine in such a way to prevent them being toppled or flipped over.

Turned or flipped items are unsuitable for cleaning, as the hollows filled with cleaning solution are not rinsed sufficiently during the freshwater rinse cycle. Small, lightweight items should therefore be sorted into special racks with appropriate covers.

Generally, plastic items should not be placed on the conveyor belt or in the racks under tension or warped. Otherwise, they could become deformed or damaged.

In general, drying plastics is more difficult due to their low heat capacity and conductivity and requires more time than, for example, glass and porcelain items.

Due to poor wettability, suitable rinse aids must be used for the fresh water rinse, with the appropriate dosage if necessary.

Experience has shown that brand new plastic items are more difficult to wet than those that have been in use for some time. It usually takes several wash cycles before better wetting and thus drying is achieved.

Only completely dry items should be stacked to prevent microbiological growth due to residual moisture. If drying at room temperature is insufficient, appropriate drying equipment may need to be provided.

Sufficient ventilation must be ensured between stacked plastic tableware items, which can be achieved, for example, by using stacking nubs or ventilation gaps.

Some types of plastic are particularly prone to absorbing natural food colorings and odors.

Lipstick residue is particularly difficult to remove due to the specific surface properties of plastic parts.

For reasons of hygiene, but also for aesthetic reasons, it is necessary to replace heavily scratched items or items whose decoration or surface has been altered.

For hygienic reasons, plastic parts should preferably be washed immediately after use!

Care must be taken to ensure that plastic items:

- are not placed on hot surfaces, hotplates, etc. to avoid damage from the heat;
- not be cleaned of coarse dirt with sharp-edged or rough utensils (e.g. knives, scouring pads, spatulas), as the surface of plastic is not very scratch-resistant and the scratches form deep indentations in the material in which microorganisms can settle, or discoloration can form.

Although melamine plastic parts are significantly less scratch-sensitive than other plastics, they tend to form small chips under heavy mechanical stress, which also result in a rough surface structure in which food residues and microorganisms can accumulate.

When tableware slides along stainless steel or other metal surfaces, roughening and discoloration (metal abrasion) can form at the points of contact with the plastic. This discoloration cannot be removed in the dishwasher.

Despite their break resistance, plastic trays made of glass fiber-reinforced plastic or melamine are also susceptible to chipping at the edges when subjected to excessive mechanical stress.

Therefore, despite their high break resistance, plastic items must be handled with the same care as porcelain and glass items.

The manufacturer's instructions must be observed for the necessary cleaning conditions.

5. Note on thorough cleaning of plastics

Plastic items become roughened by mechanical influences, e.g., scratches on the surface. This allows food and drink residues to penetrate the plastic surface more easily and leave discoloration that is often difficult to remove.

Basic cleaning is necessary for plastic items, as for other dishwasher-safe materials, if deposits and/or discoloration are observed.

For melamine, basic cleaning with basic cleaners containing active oxygen is recommended for brightening.

During basic cleaning and immersion cleaning, avoid letting strongly acidic or strongly alkaline product solutions sit on the items for too long. The items should go through the washing process without interruption and shouldn't be exposed to the cleaning solution for long periods of time, like overnight.

****

This compendium of practice, which has been drawn up by experts, should remind the reader that commercial machine washing cannot be successfully conducted on a superficial level or without the corresponding input of all persons involved in the cleaning process.

Only the understanding of technical processes, the resulting interrelations and the cooperation of all participants, particularly the dishwasher operator and staff, as well as having regular maintenance of the dishwasher, the dosing equipment and the water treatment system by the manufacturer, can produce the cleaning results expected by the user.

Consistent cooperation between the dishwasher, detergent and dosing equipment manufacturers, as well as the manufacturers of wash items, guarantees constant and optimal adaptation to practical requirements for the benefit of customers and the environment. Consistent cooperation between dishwasher, detergent, and dosing device manufacturers, as well as manufacturers of items to be washed, ensures constant, optimal adaptation to practical requirements for the benefit of mutual customers and the environment.

Issued by AK GGS
www.akggs.de

Version 02/2025